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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/065,346	10/07/2002	Huageng Luo	RD28642-1	3990

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EXAMINER	
SAINT SURIN, JACQUES M	
ART UNIT	**PAPER NUMBER**
2856	

DATE MAILED: 12/30/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/065,346	Applicant(s) LUO ET AL.	
	Examiner Jacques M Saint-Surin	Art Unit 2856	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 05 October 2004.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-23 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-20 and 22 is/are rejected.

7)☐ Claim(s) 21 and 23 is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. This Office Action is responsive to the amendment of 10/05/04.

Claim Rejections - 35 USC § 102

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Rejections - 35 USC § 102

3. Claims 1-4, 6-13, 15-20 and 22 are rejected under 35 U.S.C. 102(b) as being anticipated by Kirchner (US Patent 6,309,333).

Regarding claim 1, Kirchner ('333) discloses a vibration control system for a rotary machine having a rotor (Fig. 4a shows a deflection control system 100 for a roll 102 which includes an axle 104 having bearings 106 for supporting a roll shell 108 see: col.8, lines 64-67), comprising:

a sensor disposed within the rotary machine for sensing vibration of the rotor (sensor 1 14 connected to the interior surface 110 of the roll shell 108, see: col. 9, lines 12-13);

a vibration damping device (piezoelectric actuators 116, see; col. 9, line 14) disposed within the rotary machine (102) for imparting a reaction force to the rotor (108); and

a controller arranged in operable communication with said sensor and said vibration damping device (the sensors 114 and piezoelectric actuators 116 are in signal sending and receiving communication with a controller 118 via conductive traces 120

extending between the sensors 1 14 and piezoelectric actuators 116 and the controller 1 18, see: col. 9, lines 14-17) said controller (118) adapted to receive a sensor signal from said sensor (114) and to send a control signal to said vibration damping device from the roll shell (1 16) for damping the vibration of the rotor (108), wherein the control signal to said vibration damping device is adapted to adjust excitation of said vibration damping device based on a difference between the vibration of the rotor sensed by said sensor and an output response of the rotor vibration calculated by said controller (upon receiving feedback signals from the sensors, the controller will determine the magnitude of the vibration. The controller will then calculate output signals to be sent to each of the piezoelectric actuators 116 connected to the roll shell. The magnitude of the output signals sent to the individual piezoelectric actuators may vary because the amount of damping force or attenuating force required at each particular region of the roll may vary. Upon receiving the output signals from the controller, the piezoelectric actuators 116 will exert tensile and/or compressions forces on the dynamic surface of the roll for damping and/or controlling vibration of the dynamic surface, see: col. 12, lines 17-32). Furthermore, Kirchner discloses the controller 118 preferably uses one or more software applications stored therein, the software applications being capable of receiving feedback signals from the sensors 114, comparing the feedback signals with data stored in the memory device 126 and generating a series of output signals for transmission to the piezoelectric actuators 116. Upon receiving the output signals, the piezoelectric actuators are actuated for drawing the masses and the dynamic surface

toward one another or forcing the masses and the dynamic surface away from one another so as to remove vibrations 108, see: col. 9, lines 39-50.

Regarding claims 2 and 11, Kirchner ('333) discloses because piezoelectric elements derive their motion through solid state crystal effects and have no moving parts the response time of piezoelectric elements is in the kilohertz range so that they may be activated at very high frequencies, see; col. 4, lines 48-53.

Regarding claims 3-4 and 12-13, Krichner discloses the piezoelectric actuator preferably includes a plurality of piezoelectric actuators that are provided in contact with the dynamic surface, see; col. 4, lines 54-56. Also, col. 5, lines 62-63 discloses the piezoelectric actuators are aligned in rows over the interior surface of the shell.

Regarding claims 6 and 20, Kirchner ('333) discloses piezoelectric actuator 116F may apply a counter vibrating force to the roll shell, and also piezoelectric actuators adjacent one another may apply counter vibrating forces having different magnitudes; e.g. the piezoelectric actuator underlying mass 125E applies a counter vibrating force having a greater magnitude that the force applied by the piezoelectric actuator underlying mass 125E', see: col. 11, lines 29-38.

Regarding claims 8 and 19, Kirchner ('333) discloses the controller 1 18 preferably includes a microprocessor 124 and a memory device 126 for storing a deflection control strategy or data related to preferred operating conditions for the roll 102 and roll shell 108., the controller 1 18 preferably uses one or more software applications stored therein, the software applications being capable of receiving feedback signals from the sensors 1 14, comparing the feedback signals with data

stored in the memory device 126 and generating a series of output signals for transmission to the piezoelectric actuators 1 16, see; col. 9, lines 36-50). The microprocessor 124 inherently includes the analog to digital converter for converting the analog signal to digital before processing and the digital to analog converter for converting the digital signal to analog signal before outputting the processed signals. In addition, the memory may have stored therein look-up tables, a control strategy algorithm and/or an adaptive feedback control strategy algorithm (see: col. 6, lines 15-1 7) .

Regarding claim 9, Kirchner ('333) discloses the ratio of masses and piezoelectric actuators to sensors is approximately 100:1, see: col. 11, lines 3-4. Regarding claims 10 and 15-16, as discussed above, they are rejected for the reasons set forth for claim 1 . Furthermore, Kirchner discloses upon receiving the output signals from the controller, piezoelectric actuators 116 will exert tensile and/or compression forces on the dynamic surface of the roll for damping and/or controlling vibration of the dynamic surface (col. 12, lines 28-32). Fig. 4a of Kirchner shows roll 102 includes an axle 104 having bearings 106 for supporting a roll shell 108 which is generally cylindrical or tubular and includes an inner surface 1 10 defining an inner diameter and an exterior surface 1 12 defining an outer diameter, see: col. 8, lines 66-67 and col, 9, lines 6-10).

Regarding claim 17, as discussed above, it is rejected for the reasons set forth for claim 1. Furthermore, Kirchner discloses sensor 114, piezoelectric actuator 116 and controller 118.

Regarding claim 18, as discussed above, the sensors 114 and piezoelectric actuators 116 are in signal sending and receiving communication with a controller 118 via conductive traces 120 extending between the sensors 114 and piezoelectric actuators 1 16 and the controller 118, see: col. 9, lines 14-17.

Regarding claim 22, as discussed above, it is rejected for the reasons set forth for claim 1. Furthermore, Kirchner ('333) discloses piezoelectric actuator 116 may apply a counter vibrating force to the roll shell, and also piezoelectric actuators adjacent one another may apply counter vibrating forces having different magnitudes', e.g. the piezoelectric actuator underlying mass 125E applies a counter vibrating force having a greater magnitude that the force applied by the piezoelectric actuator underlying mass 125E', see: col. 11, lines 29-38.

4. Claim 17 is rejected under 35 U.S.C. 102(e) as being anticipated by Lo et al. (US Patent 6,601,054) or Kotoulas et al. (US Patent 6,493,689).

Regarding claim 17, Lo discloses an AVC (feedforward-feedback) system comprising reference sensor means for deriving at least one reference signal containing information about at least one primary vibration; error sensor means for sensing a combination of at least one primary vibration and at least one cancelling vibration to provide at least one error signal; a recursive neural network, comprising a plurality of weights, for processing said at least one reference signal and said at least one error signal to generate at least one control signal; and secondary source means, comprising at least one secondary source, for converting said at least one control signal into said at

least one cancelling vibration, wherein said weights are held fixed online during the operation of said feedforward-feedback AVC system, see: col. 5, lines 19-46.

Regarding claim 17, Kotoulas discloses calculates estimated vibration and noise envelope signals, compares the estimated signals with said sensed vibration and noise envelope signals, produces plant gradient signals representing the errors in the emulator model of the plant, and feeds back said plant gradient signals to said controller neural network to allow said controller neural network to adapt itself during runtime using a gradient descent algorithm based on said plant gradient output of said emulator neural network and said sensor preprocessing module, see: col. 28, lines 32-40.

Claim Rejections - 35 USC § 103

5. Claims 5 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kirchner (US Patent 6,309,333) in view of Teel (US Patent 4,972,389).

Regarding claims 5 and 14, they differ from Kirchner by reciting said piezoelectric actuator is made of a material selected from the group consisting of lead-zirconate-titanate, lead-titanate, lead-zirconate, and barium-titanate. Teel discloses piezoelectric elements 26 are formed from a suitable well known ceramic crystal material such as barium-titanate or lead-zirconate-titanate, see: col. 3, lines 62-64. It would have been obvious to one having ordinary skill in the art at the time of the invention to utilize in Kirchner the piezoelectric element of Teel because it would provide a damping device having a material including on the opposite plane surfaces electrodes formed as a

conductive coating of silver or a silver compound thereby obtaining a reliable damping for the vibration control.

Allowable Subject Matter

6. Claims 21 and 23 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

REMARKS

7. In response to Applicant's arguments "The Kirchner reference discloses a controller 118 including a microprocessor 124 and a memory device 126, the controller 118 being operable to receive feedback signals from sensors 114, compare the feedback signals with data stored in the memory device 126 and generate output signals for transmission to piezoelectric actuators (see column 9, lines 36-45). However, the reference does not teach or disclose the parameters which are analyzed by the controller algorithm to arrive at a control signal or a counter vibration response", the Examiner agrees with the teachings of col. 9, lines 36-45, however, respectfully disagrees with the last sentence because the reference of Kirchner clearly discloses in col. 12, lines 17-32 upon receiving feedback signals from the sensors, the controller will determine the magnitude of the vibration. The controller will then calculate output signals to be sent to each of the piezoelectric actuators 116 connected to the roll shell. The magnitude of the output signals sent to the individual piezoelectric actuators may vary because the amount of damping force or attenuating force required at each particular region of the roll may vary. Upon receiving the output signals

from the controller, the piezoelectric actuators 116 will exert tensile and/or compressions forces on the dynamic surface of the roll for damping and/or controlling vibration of the dynamic surface.

8. In response to Applicant's arguments "the Kirchner reference does not mention the calculation of an output response of the centralized motion of the rotor, as recited in the presently amended claims 1, 10, 17 and 22", the Examiner respectfully disagrees with applicant's arguments because the reference teaches in col. 12, lines 22-24, the controller will then calculate output signals to be sent to each of the piezoelectric actuators 116 connected to the roll shell. Furthermore, the Kirchner reference discloses the system also preferably includes a controller in communication with the at least one sensor for receiving the feedback signal and sending the output signal to the at least one piezoelectric actuator. If the feedback signal indicates that the dynamic surface is undergoing vibration, the piezoelectric actuator, upon receiving the output signal, applies a counter force between the dynamic surface and the mass upon receiving the output signal for reducing or controlling vibration of the dynamic surface, see: col. 4, lines 23-35.

Response to Arguments

9. Applicant's arguments filed 10/05/04 have been fully considered but they are not persuasive.

Conclusion

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jacques M Saint-Surin whose telephone number is (571) 272-2206. The examiner can normally be reached on Increased Flex.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hezron Williams can be reached on (571) 272-2208. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jacques M. Saint-Surin
December 22, 2004

DANIEL S. LARKIN
PRIMARY EXAMINER